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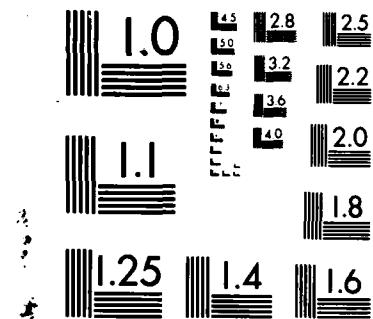
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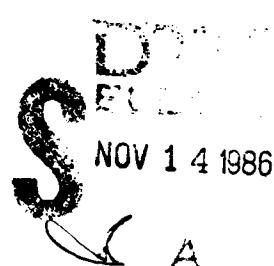
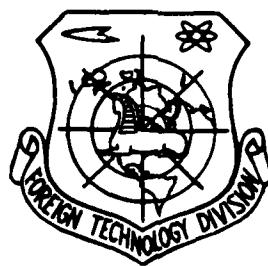


DISCUSSION ON THE REFORM AT THE INSTITUTE OF MILITARY INDUSTRY

by

Liu Fufiu

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Discussion on the Reform at the Institute of Military Industry 24

Liu Fufiu

(The 29th Institute of Ministry of Electronic Industry)

The Institute of Military Industry of China is an important force in the military industry. In the economic structure reform, it is more significant to accelerate the reform of the institute since it will also accelerate the development of weapons to reinforce the Chinese national defense and the transfer of military technology to civilian applications to serve the national economy.

### I. Changing From Supply System to Paid Contract System

For years, the Institute of Military Industry employed a supply system. Regardless of the technical accomplishments and economic benefits, the research funds and administrative expenses (including wages) were totally paid for by the Government. The institute relied on the government budget and the employees depended on the institution budget as if everything came out of a common pot. The institute was essentially not managed with economic means. It did not have any economic leverage. Consequently, this type of institute lacks pressure, dynamic force and vitality which hinders progress. It also slows down the growth of personnel and prevents any improvement of economic benefits. An effective way to overcome this problem is to

✓ implement the paid contract system. ✓

The paid contract system has many advantages. First, it reduces the dependence of the institute on the Government. It fully mobilizes and utilizes its capabilities to actively undertake more contracts and to complete them as soon as possible. Second, the institute is made to focus on new technology and new products to have more accomplishments. Advanced technology can attract more users to sign more contracts. Third, the institute is made aware of the importance of quality control to ensure the technical performance, quality and reliability of the products in order to gain the trust of the users. Fourth, it makes the institute learn modern management theory and methods to improve the management standard, improve efficiency, reduce cycle and lower cost to maximize the economic benefits. In summary, it increases the pressure, dynamic force and vitality of the institute in order to have more accomplishments to train more qualified personnel and to improve the technical economic benefits.

The paid contract system can be divided into vertical and lateral compensation contract systems. All research activities associated with the development of specific models of weapons for the government are in the vertical rewarding contract mode. The lead organization and the implementing unit sign a contract which more or less covers the following: (1) objectives and significance of the research and development, (2) technical specifications (including quality and reliability), (3) scheduling and completion date, (4) form and quantity of the

accomplishments, (5) expenses and payment schedule and dates, (6) obligations and responsibilities of both parties, (7) economic responsibilities when the contract is terminated by one party, and (8) rewards and penalties. The contract is validated after being signed by both heads of organizations and the official seals of both organizations must be applied. All research and development activities proposed directly by other plants, institutes, schools, military field outfits and civil organizations are handled as lateral paid contracts. The institute can sign contracts with the user. The contents of the contract are essentially the same as a vertical contract. When a contract is being signed, the local notary may be invited to participate to make it legally effective.

The following problems must be clarified as we implement the paid contract system.

1. Research and Development Funding. It includes direct expenses (such as devices, materials, special equipment, external support, and experimental costs) and indirect expenses (such as salaries of research and management personnel, depreciation of instruments, energy, transportation and management fee) associated with the subject. The funding required depends on various factors such as the technical specifications of the task, /25 difficulty of the technology, quantity to be developed, amount of labor and materials required, and the management level of the institute. There is no doubt that research and development cost is the focus of the contract. Both sides will bargain based on various arguments. As for this problem, it is possible to

propose a budget of direct and indirect expenses and a payment schedule based on the technical requirements, schedule and quantity presented in the original preliminary plan. Due to the exploratory nature of research and development, the degree of difficulty increases as more new technologies are required. The more uncertain factors there are in research and development, the higher the risks. Therefore, on the basis of the budget, unpredictable expenses should be allowed to be added. The higher the exploratory nature is, the more that should be allowed. We can control it to between 5-15%. After the budget is proposed, during negotiation, both sides should patiently listen to the other side in order to reach a reasonable agreement acceptable by both sides to be included in the final contract.

2. Compensation Problem in Contract System. After a contract is signed, the implementation results are closely related to the efforts dedicated, and the technical quality and management level of the institute. The following outcomes may result: (1) task finished ahead of schedule and research expenses saved, (2) task finished early but found not saved, (3) task finished ahead of schedule and cost running over budget, (4) task finished on time, fund saved, (5) finished on time, no fund saved, (6) finished on time, overspent, (7) work finished late, fund left over, (8) work finished later, no fund left, additional compensation will be paid only when there is fund saved. Moreover, the higher the amount saved, the more the compensation should be in order to stimulate the enthusiasm of the contractor. The compensation can be handled in two ways to be negotiated by

both parties.

The first way is to adopt a fixed cost system. When a contract is completed on time according to specifications, the results are verified and transferred. The remaining fund, regardless of the amount, stays with the contractor. When overspending occurs, the contractor must find its own support to finish the job.

The second method is to allow the contractor to keep a portion of the fund saved after the work is done. The remaining portion goes back to the originating party. If a cost overrun occurs due to irresistible factors, the contractor may issue a report stating the reasons to be reviewed by the other party for additional funding. Table 1 shows a proportionality for reference.

Table 1

K (%)	<15	15.1-25	25.1-35	35.1-45	45.1-55	55.1-60	65.1-75
B (%)	100	99.9-90	89.9-80	79.9-70	69.9-60	59.9-50	49.9-40

In the table, K is the percentage of the fund saved which is calculated based on equation (1). B is the proportion of compensation. When  $K \leq 15\%$ , B=100%. As K increases by 0.1%, B decreases by 0.1%. The amount of compensation G is calculated based on equation (2).

$$K = J/H \quad (1)$$

$$G = J \times B \quad (2)$$

where J is the amount of research funding saved and H is the total amount specified in the contract.

The procedure to calculate the compensation is to calculate K based on equation (1) (to be rounded off after two digits beyond the decimal point) to determine the compensation proportion B and then calculate it according to equation (2). For example, if the development cost specified in the contract is 1,000,000 yuans and 153,500 yuans is saved upon completion, based on the method described above, K=15.4%, B=99.6%, and G=152,886 yuans. Table 2 shows the compensations obtainable at various amounts of savings when H=1,000,000 yuans.

Table 2

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J (万元)	15	15.1	15.2	...	16	20	25	...	50	55	57	57.2	57.4	57.5	57.6	57.7	57.8	58
K (%)	15	15.1	15.2	...	16	20	25	...	50	55	57	57.2	57.4	57.5	57.6	57.7	57.8	58
B (%)	100	99.9	99.8	...	99	95	90	...	65	60	58	57.8	57.6	57.5	57.4	57.3	57.2	57
G (万元)	15	15.0849	15.1696		15.8419	22.5	32.5	33.33	33.06	33.0616	33.0624	33.0625	33.0624	33.0623	33.0616	33.0621	33.0616	33.06

1. 10,000 yuans
2. 10,000 yuans

Based on the above table, this type of compensation proportion follows a normal distribution. As the saving increases, the compensation also increases. The principle of more compensation at higher savings is realized. This encourages the contractor to save money. However, when K is increased to 57.5%, B reaches its maximum at 57.5%. Beyond this point, G begins to fall with increasing savings. This can prevent some organizations from intentionally overbudgeting the development costs in order to gain higher compensations.

3. Rework and Penalties. In order to encourage the contractor's enthusiasm, whenever the contract is fulfilled ahead of schedule and important technical specifications exceed those listed in the contract, in addition to the compensation due for the amount of saving based on the method introduced above, there will be other rewards. Whenever a contract is completed in time, the original technical requirements are not met, and the contract is terminated by one party, there will be penalties. In order to effectively execute the contract, reduce the cycle, and improve the performance and quality of products. It is appropriate to have high rewards and severe penalties. The rewards and penalties should be specified by both parties in the contract.

## II. Changing From Pure R&D to Managed R&D

Over the years, the Institute of Military Industry has been in a pure research and development mode. Research and administrative expenses are supplied which is the foundation for

the pure R&D type. The obvious characteristics are lack of management, lack of emphasis on economic accounting, ignoring cost, neglecting promotion of accomplishments in various applications, and lack of focus on optimizing the economic benefit. The past experience proved that pure R&D does not agree with the laws of scientific and technical development and of economic development. Many people are recognizing this serious problem and adopting suitable measures to manage it. Furthermore, they explored some opportunities and were generously rewarded. This demonstrates the necessity for such institutes to "change mode". Hence, in the economic system reform, we must switch these institutes to the right track of producing results, training personnel, and improving economic benefits. How can we switch the mode?

1. Establishing the Correct Guiding Ideology. We must firmly implement the policy of the central government of "uniting the military with the people, uniting peace time with war, giving priority to military supplies, and using civilian resources to pay for military needs" as well as the instruction that "in addition to ensuring the completion of development and production of weapons and equipment as specified by the Chinese State Department and the Central Military Commission, defense industries must be fully involved in the development and manufacturing of civilian goods. Under the premise that military development and production duties are completed, we should keep all options open to improve the economic benefits. It is absolutely forbidden to pursue pure economic benefits by ignoring

military duties. This is the fundamental difference in the reform of military industry research institutes as compared to the reform of civilian research institutes.

2. Actively Initiating Research to Obtain More Technical accomplishments, emphasizing promotion and application, and focusing on the transfer of military technology to civilian use to rapidly convert it to economic benefits. Two problems must be resolved in order to fulfill this task. First, we must improve our ideological understanding to overcome the tendency of focusing on accomplishments but neglecting applications.

Obtaining technical accomplishments is the first step. If we do not apply them to gain economic benefits, then they are "put on the back burner". In spite of the accomplishments, they have no useful value. Next, we must formulate rules and regulations to reward people who promote and apply technical accomplishments. People who work hard to promote these accomplishments should be rewarded to ensure that the policy is implemented. Then, a new situation will emerge where higher economic benefits can be obtained.

3. Facing the economy and the society. The special features of military industry institutes are: There are more middle and high level technical people; instruments and equipment are relatively modern and complete; the potential and capability to do design and pilot building is substantial; and the ability to/27 face the economy and the society under the premise of completing military duties first exists. Based on the specialities of the technical staff, we must sign more contracts with industrial,

agricultural, forestry, animal farming, fishing, business, academic and military departments to transfer technology and accomplishments with compensations. We should offer technical consulting services and accept materials for processing. In addition, we can set up technical development corporations with the relevant outfit to develop 1-2 key products to bring in more profits. We can also invest technology, intelligence or money in private businesses. In summary, as we are facing the needs of the economy and the society, we must take advantage of our specialities to open more avenues to bring in revenues. We should avoid getting involved in projects without any economic analysis.

4. Intensifying survey and strengthening collection and analysis of technical and economic information to improve management decision making ability. A policy must be made decisively. Under the condition that internal and external competitions are permitted, intelligence is the key, efficiency is vital and time is money.

5. Strengthening management to establish a good system to calculate the development costs and other expenses for development projects. Effective measures must be adopted to rigorously control the development cost and various management expenses. A technical economic responsibility system and management system must be established in order to strengthen management to make more profit.

6. Signing internal contracts to establish an internal contracting system. We must overcome the thinking that employees

are "eating out of the same large pot" of the institute. The bonus gap must be widened. People who contributed to obtaining technical accomplishments and applications, and to improving the economic benefits, must be handsomely rewarded. People who caused economic losses must be punished. We may also float wages internally. We must not let those who work hard get the same pay as those who do not work at all. We must not allow the outstanding workers to be paid the same as those who perform poorly. This is a complicated, difficult and delicate task. Surely, we will meet resistance and difficulty in implementing this policy. We must be daring in liberating technical research by economic means.

7. Reforming the leadership system and management system in the institute to meet the requirements. We should implement a director system to separate the political issues from business issues. The director is totally responsible for research, production, management and administration. He has the power to manage people, money and materials. He should choose good assistants to help him. For instance, he should select a chief engineer who is good in technical management, associate directors (up to two) who specialize in planning, manufacturing, management, administration and logistics, and a chief accountant who specializes in accounting, budget control and profit improvement. In the meantime, he should establish various management departments and fine qualified people. We should not fill positions with incompetent people. The organization must be lean, the work force must be trim, and efficiency must be

high.

### III. Several Problems to Focus and Resolve

1. Establishment of a fund for basic research. As we all know, without fundamental scientific research there is no advanced technical reserve. Consequently, there is no advanced equipment. Only when basic research is done and new technical reserve is in place, the development of weapons and equipment can be done in short cycles at low costs. This type of work is highly exploratory. There are many uncertain factors. The work may even fail. Hence, there are many problems if we use compensating contract formats. It may be too difficult to proceed. In order to ensure that this work goes on normally to continuously improve the level of equipment and weapons, it is mandatory to establish a fund for basic research. Many basic research projects in military industry involve large investment and long periods. The institute is too financially weak to undertake this task. The Government should pay to resolve the problem. Some less costly projects may be paid for by the development fund kept aside by the institute. We can determine the amount of government funding required by presenting the basic research projects, budgets and schedules to the superior organization for approval. After the work is completed, if there are funds left, they may be transferred to other basic research projects. If there is a cost overrun, a supplemental budget will be requested. The lead organization must issue instructions and

strengthen the monitoring work. The institute must put in sufficient resources to carry the work. Because basic research requires hard work by the brain, its effectiveness takes time to show. Also because it may fail, we should provide encouragement and guarantee rewards to allow the researchers to work enthusiastically. Basic research and technical reserve projects are long range work. We must not be near-sighted to only focus on short term profits.

2. Technology Reform. As science and production techniques /46 advance, the institute must continuously carry out technological reforms. The instruments and equipment for research, development and production must be replaced. As mentioned before, the institute is financially incapable of handling technical projects involving a great deal of investment. We should study a limit beyond which the Government should invest in such projects. Projects below this limit should be paid for by the development fund set aside by the institute.

3. Expansion of Institute Autonomy. We are relaxing the constraints and adjusting the upper level structures which are hindering the growth of scientific research and development. In this reform of the economic system, new problems will have to be exposed. It is necessary to make changes based on the situation. We must insist on breaking the obstacles hindering the growth of scientific research and preventing the improvement of profit margins.

4. Distribution of Shares Set Aside by the Institute. After we implement the compensating contract system, the

technically acquired profit should not be forwarded up the ladder. Nevertheless, there should be a proper distribution formula. We not only must consider the growth of the institute but also must take employee benefits into account. The following proportion is considered appropriate: 50% of the proceeds goes to a collective employee welfare fund, and 25-20% goes to an award fund. The latter two may be pooled together to allow more flexibility.

5. Because of its specialities, it is more difficult for some military research institutes to transfer its accomplishments for civilian applications. There are severe limitations in business expansion. Some of them are located in geologically inconvenient areas where there is little access to information. The management fee and research costs are high. There are numerous difficulties managing these institutes. There is a need to formulate special regulations and favorable policies for these institutes.

Research Institutes

Xia Guofan

(608 Institute of Ministry of Aerospace Industry)

Based on the policy of "securing military needs and transferring to civilian use "and" combining military needs with civilian applications", defense research institutes should undertake responsibilities in both national defense and economic construction. Under the premise of ensuring the development of military goods, they should be dedicated to developing civilian products of urgent demand. They should serve to improve the productivity of the society, to make the economy take off, and to reform focal point construction and present technology.

(I)

Defense research institutes are loaded with talents, knowledge, and technology. They have comprehensive experimental, pilot production and testing means. Consequently, they have considerable development capability in their corresponding technical fields. Therefore, a defense research institute should have its own characteristics in selecting the subjects of research and models of civilian products for development. The first thing is to avoid rushing into something like a hungry person who is not choosey about his food. Do not fight against the civilian industry for the same "food". We should avoid

getting involved in producing low technology products which can be manufactured by civilian factories. The second thing to avoid is to compete with the civilian industry for the same products. We must not rush into fashionable and modern products. The third thing to avoid is to get involved in labor intensive products which require a great deal of manpower and equipment. We must focus our research to technically difficult and urgently needed products. We must switch our emphasis to advancing production technology and promoting economic growth.

(II)

Since the Third Plenum of the Eleventh Congress of the Chinese Communist Party, our institute has insisted on the path of combining military and civilian needs. Based on the overall picture of national construction, the military needs are ensured and the technology is transferred to civilian use. According to the strategy of "facing the economy, selecting the target, focusing on emphases, stressing effectiveness", the ideology is liberated and the horizon is widened. We enthusiastically organized civilian product development for over a dozen trades including food, textile, light machinery, coal, petroleum, railroad, electronics, shipbuilding, medicine, hygiene, culture, scientific research and construction. We undertook over 40 major and medium size development projects. In three years, the total amount of contracts has reached over ten million yuans. Twenty-seven projects were completed and put in use and twenty-one of

these projects filled voids for China. Some products have reached similar advanced levels as comparable products made abroad. Our institute was relatively quickly transformed from a "closed" type to an "open" type organization. We are changing from the traditional research structure to a technical improvement and development mode, from a pure "military product" type to a "combined military and civilian" type.

Based on our experience over the years in developing civilian products, we recognize that when similar technology is involved, the accurate execution of the following eight formulas: "New", "Excellent", "Reform", "Creativity", "Joint Venture", "Transfer", "Fast", and "Service" is an effective way to develop civilian products in depth as well as in breadth.

#### 1. "New"

In order to meet the needs in economic construction and technical development, the technical advantage of the institute must be fully utilized to import, initiate, redesign and develop new products. For instance, our institute developed 17 new instruments to measure displacement, temperature, pressure, rate of rotation, vibration, flow rate as well as to monitor the operation of technical equipment. They are being used by the military and the civilian. The demand is high. Industrial organizations related to bearings, railroad, petroleum, and electronics are requesting us to transfer these technologies to their areas.

#### 2. "Excellence"

The quality of a brand name product must be better than

average. "Excellence" is the key. The technical staff of any research institute must strengthen the concept that "quality comes first and reputation is of utmost importance". Based on the needs and requirements of the users, safe, durable, good looking and reputable products which are easy to repair are to be developed. For example, we developed an automated rail production line with Zhuzhou Bridge Plant. As compared to the old line, productivity per shift increased by 25%. The cost per unit drops by 25%. The amount of electricity consumption decreases by 72%. The amount of labor required is reduced by 50%. The land required is saved by 25%. The quality of the product is consistent, eliminating the extrusion mark problem in the past. It takes 7 seconds to produce a piece. The annual profit is 600,000 yuans. The development cost was recovered in less than 3 months. Due to its quality and profitability, the plant has requested us to develop a second and third automated production line to increase productivity.

### 3. "Reform"

Civilian industries are undergoing technological reform to bring their production to a new technical base. This is a necessary path to follow in order to stimulate the economy and to realize the Four Modernizations. Therefore, it is the duty of defense industry institutes to devote their effort on technological reform to support production. After successfully developing the first automated bread making line in China for

zhuzhou in response to the need for modern food equipment, our institute is also responsible for developing automatic bread production lines in Shanghai, Beijing, Fuzhou and Shengjun. Presently, the "Shanghai line" is being installed and adjusted and will enter a pilot production stage. The line has 53 pieces of equipment and 8 control consoles. The entire line is microprocessor controlled and mechanically linked. The plant, which originally relied on manual operations, is automated to operate at high speeds. A bread can be made in 0.85 seconds. Without adding new personnel, the daily productivity increased from 7 to 18 tons; an increase of nearly 2.6 fold. Based on technical improvement, the plant was able to expand its productivity and to improve its profitability.

#### 4. "Creativity"

Defense institutes should be actively involved in the research conducted by private industries on importing technology by following the path of "import, digest, develop, create". We should be more innovative. There is a Japanese saying that "to consolidate is to create". They spent 4.36 billion yuans between 1950 and 1973 to bring in 21863 items of foreign technology and digest them. In addition, they combined them with their own technology; through improvement and consolidation, the technology was further advanced to promote economic growth. We must not be satisfied with following other people's footsteps just to copy and initiate. Instead, we should analyze and study all the products we import systematically in depth in order to combine their advantages to create new products which are more superior.

For example, our institute added an adjustable air intake to an imported engine to solve the problem of burning lightweight fuel by motorcycles. This created a new way to conserve energy. This fuel conserving device is added to a new imported motorcycle. Its fuel consumption per hundred kilometer drops by 14%. We modified three Model 3 automatic mat weaving machines to make them become multi-functional. The machine stops based on optoelectronic principle. The yield is improved to 99.6% and the quality is good. We managed to "convert foreign equipment to Chinese applications". Our experience proves that it is much easier to develop civilian products of higher technical standards by improving the foreign technology we import. We should be able to make fast progress in science and technology.

##### 5. "Transfer"

Technology transfer should be done in many forms through varicus channels to allow technical accomplishments to be exchanged. We should primarily choose to transfer highly technical and profitable results, which are difficult for the factories to develop by themselves, to private industries. The "investment" in intelligence by the defense institute will thus result in more "productivity". In addition, to direct transfer of technical accomplishments and technology, our institute also modifies military equipment for various private industries. For instance, we developed an inert gas generator for fire extinguishing purposes in mines. A natural gas compressor was developed to recover lightweight fuel and produce liquified gas. A gas energy catalysis device was developed to recover residual

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heat and pressure for power generation for the petroleum and steel industry.

#### 6. "Joint Venture"

Based on the principle of "sharing risks and profits", defense research institutes and private industries should jointly import technology, develop products and manage plants. Since last year, our institute and Zhuzhou Automation Instrument Plant created the "Nanhang Automation Instrument Joint Venture Corporation" to manufacture a technical product developed by our institute, eddy current sensor in the form of a joint development-production entity. As joint ventures with Shengjun Foreign Trade Company, Hong Kong Lianhau Company and Hunan Import and Export Company, we formed Eastern General Electric Company and Dong Xian Electronic Component Development Company to conduct business in various areas such as computer controlled intelligent instruments, new optical, thermal, acoustic, electric and mechanical testing instruments and sensors, and development, production and service of computer software. With Wenzhou Radio Equipment Plant, we are jointly involved in the import, development, manufacture and management of electronic products. With Hunan Changde Textile and Dye Plant, we are involved in the development of new techniques and equipment. By way of various joint ventures, the technology and the technical advantage of the institute are effectively combined with the production capability of the factories, as well as with the sales networks of the business. They are combined with the vast productivity of the private industries to greatly reduce the development-pilot-

production-sales cycle to accelerate the process of converting technical accomplishments to productivity.

7. "Fast"

Facing the new trend that "time is money and efficiency is life", we must work fast in developing civilian products. At the present moment, science and technology leap very fast and the market is also changing very fast. If the development cycle is the order of three to five years, the technology might become outdated. The product might be off the peak. Therefore, defense institutes should have an urgency to fight for high technology in a short time period to maintain the leadership position in competition. The "conversion" process must be accelerated to reduce the cycle to attain the highest profitability possible.

8. "Service"

Defense research institutes must earn their reputation by providing good technical service. Especially in exploratory development, it is not possible to have a perfect start. After a civilian product is released for production, service must follow. Among our service items, first users must be trained to make the operators understand the performance and structural characteristics of the equipment. Next, we should give guidance in the pilot building stage to help manufacturing master the operating skill, maintenance, knowledge and safety regulations. Third, we must replace failing parts in time to eliminate any threat to quality and to ensure that the equipment is always in a good technical condition. Fourth, we should visit the users to obtain information on equipment improvement. Because we are responsible

and our service is good, we earned our reputation in developing civilian products. In the past, we were seeking projects to work on. Now, we are receiving calls, letters and telegrams to ask for our help. Our opportunities in developing civilian products become wider and wider.

(III)

In order to ensure the success of defense research institutes in the highly competitive, complex and changing technical market, we must follow the instruction given by Comrade Hu Yaobang: "We must take a strategic view in dealing with the Four Modernizations. When we make the first move, we must consider the second and third step".\* We must focus our attention to the future and do a good scientific analysis and prediction for medium and long range in the future.

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\* From the speech addressed to the representatives in the Engineering Construction Meeting to Aid Tibet, reported in ((People's Daily)) on 12/20/84.

1. We have to analyze, predict, master and utilize new technologies and new trends of development. Let us take the opportunity of technological revolution. We must investigate the direction and trend of development and predict emerging technologies, products and their prospects. By doing so, we will be standing at the leading edge of modern technology to develop civilian products which are characterized by the density of technology. We will then be able to reduce our gap with the leader in the world.

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2. We must be able to analyze and predict our capabilities to compete and shift direction. We not only must be actively involved in proprietary civilian products but also must have a technical reserve to implement the policy that "when other people do not have the technology, we do ; when other people have the technology, ours is better. When everyone has the same technology, we will change direction". We must have up to date information to allow us to shift direction with ease. We should be dynamic in establishing a good cycle in civilian product development.

3. We should do a good job in the analysis and prediction of market capacity and variation to avoid the development of products of short "lifetime". Our products must be able to survive any market fluctuation over a long period of time.

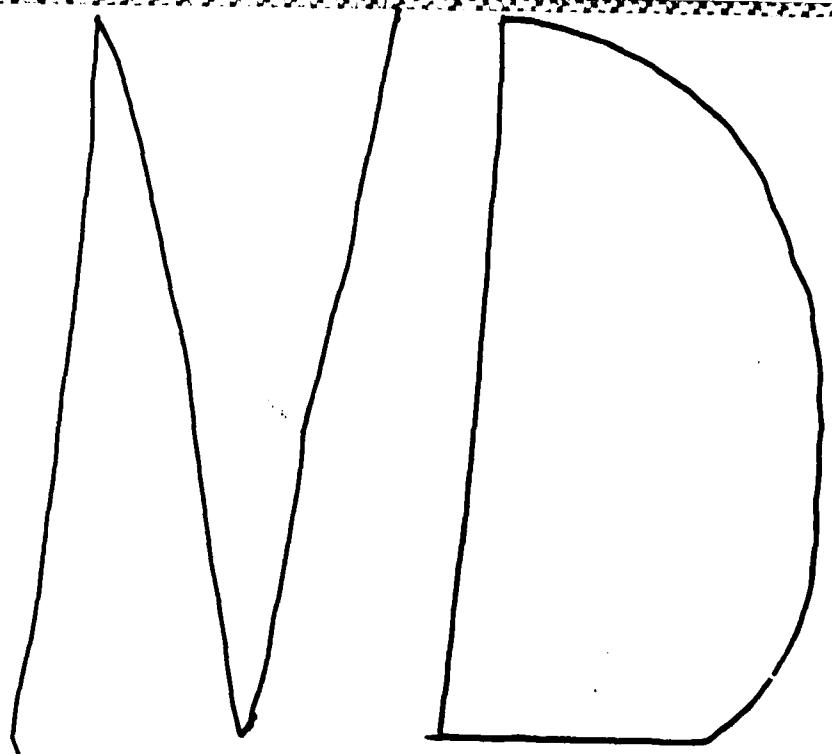
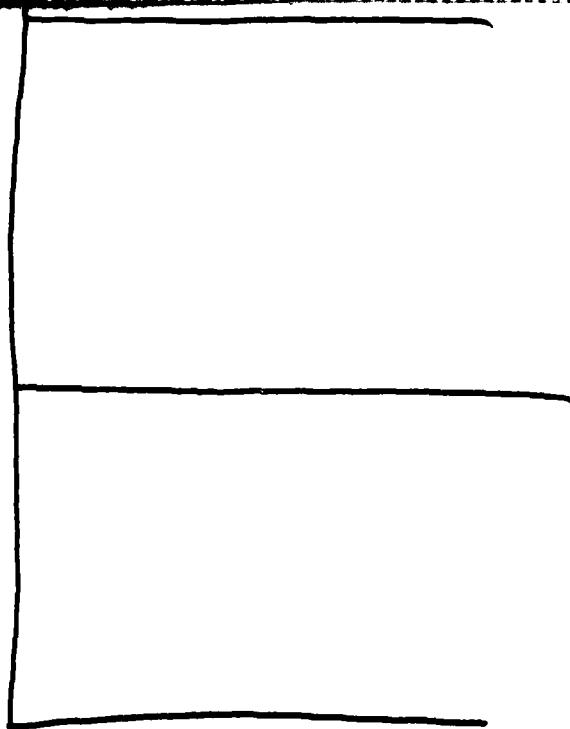
4. We must analyze and predict the economic and social benefits. We should focus on the macroscopic social benefit. Starting from the microscopic economic benefit, the economic benefit of the research institute and the macroscopic social

benefit created by technical advancement and social development are combined to provide vitality to the development of civilian products.

Based on our experience, we must have the spirit of aggressiveness, exploration and innovation to analyze and predict near, medium and long range goals. We must be able to reach the goal of "producing first generation products, developing second generation products and researching third generation products". By doing so, the defense institute will have products developed in hand, markets to sell the products and goals for future development. We will then be able to remain, and our vitality will be continuously successful in meeting the challenges in future technological revolution.

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E408 AFWL	1
E410 AD/IND	1
E429 SD/IND	1
P005 DOE/ISA/DDI	1
P050 CIA/OCR/ADD/SD	2
AFIT/LDE	1
FTD	1
CCN	1
NIA/PHS	1
LLNL/Code L-389	1
NASA/NST-44	1
NSA/1213/TDL	1
ASD/FTD/IQIA	1



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